THE CLAIMS

1. A magnetic memory device comprising:

a data layer having a magnetization that can be oriented in first and second directions; and

a synthetic ferrimagnet reference layer, the data and reference layers having different coercivities.

2. The device of claim 1, wherein the data layer has a higher coercivity than the reference layer.

3. The device of claim 1, wherein the reference layer includes first and second ferromagnetic layers separated by a spacer layer, the first and second ferromagnetic layers having different coercivities.

4. The device of claim 3, wherein the spacer layer is electrically conductive and magnetically non-conductive.

5. The device of claim 3, wherein the coercivity of the reference layer is determined by the ratio of thickness of the first and second ferromagnetic layers.

6. The device of claim 3, wherein magnetic moments of the first and second ferromagnetic layers substantially cancel out.

7. The device of claim 1, further comprising a first conductor on the first layer, an electrical insulator on the first conductor, and a second conductor on the insulator.

8. The device of claim 7, further comprising a third conductor in contact with the second layer, the third conductor being orthogonal to the first conductor.

9. The device of claim 1, further comprising a first conductor in contact with the data layer, and a second conductor in contact with the reference layer, the first and second conductors being orthogonal.

10. The device of claim 1, further comprising a spacer layer between the data and reference layers.

11. The device of claim 10, wherein the spacer layer is an insulating tunnel barrier.

12. The device of claim 1, wherein the reference layer is not pinned.

13. A reference layer for a magneto-resistive device, the reference layer comprising:
first and second ferromagnetic layers having different coercivities; and
a spacer layer between the first and second layers.

14. The reference layer of claim 13, wherein the spacer layer is electrically conductive and magnetically non-conductive.

15. The reference layer of claim 13, wherein coercivity of the reference layer is determined by the ratio of thickness of the first and second ferromagnetic layers.

16. The reference layer of claim 13, wherein magnetic moments of the first and second ferromagnetic layers substantially cancel out.

17. The reference layer of claim 13, wherein the reference layer is magnetically soft.

18. An information storage device comprising an array of memory cells, each memory cell including a data layer and a soft ferrimagnet reference layer, the data and reference layers having magnetizations that can be switched between first and second directions during write operations, only the second layer being switchable between first and second directions during read operations.

19. The device of claim 18, further comprising electrically conductive and magnetically non-conductive spacers layers separating the data and reference layers.

20. The device of claim 18, wherein reference layer coercivity is determined by the ratio of first ferromagnetic layer thickness to second ferromagnetic layer thickness.

21. The device of claim 18, wherein magnetic moments of the data and reference layers of a ferrimagnet reference layer substantially cancel out.

22. The device of claim 18, wherein the memory cells include magnetic tunnel junctions.